IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Maeda et al. Art Unit: 1742

Serial No.: 09/631,491 Examiner: Harry D Wilkins, III

Filing Date: August 3, 2000

For: Hydrogen Absorbing Alloy and Nickel-Metal Hydride Rechargeable Battery

Assistant Commissioner for Patents
Washington, D. C. 20231

DECLARATION PURSUANT TO RULE 132

I, Satoshi Shima, hereby sincerely and solemnly declares that

1. I graduated from Hokkaido University in March, 1980, being specialized in metallurgical engineering. Since April, 1980, I have been employed by Shin-Etsu Chemical Co., Ltd., assignee of the above-identified application where I has been engaged in research relating to rare earth metal and hydrogen absorbing alloy. I am one of the named inventors of the above-identified application and I am familiar with the subject matter disclosed in the application as well as the disclosures in the references cited against the claims.

2. Because Yanagihara et al (JP 60-250557 A) discloses the alloy having the composition of $LaNi_3Co_{17}Mg_{0.3}$ (Electrode No.8 of

Table), the Examiner indicates that the alloy having the composition of $LaNi_3Co_{17}Mg_{0.3}$ might have the same lattice constants as those of claim 6 so that the novelty for the subject matter of claim 6 would be denied. The alloy having the composition of $LaNi_3Co_{17}Mg_{0.3}$ was prepared by the method described in Yanagihara et al. The obtained alloy was ground in a mortar of stainless steel to be powder and lattice constants thereof were measured using a X-ray diffraction method. The a-axis and c-axis lengths thereof were 5.045Å and 3.991Å, respectively. Thus, it does not deny the novelty of the subject matter of claim 6.

3. In order to show the significance of the lattice constants in the present invention, the alloy having the composition of $La_{0.8}Ce_{0.12}Pr_{0.04}Nd_{0.04}Mg_{0.05}Ni_{4.36}Co_{0.2}Mn_{0.3}Al_{0.39}$ which contains 2.70wt% Co and 0.28wt% Mg was prepared by the method described in the present specification. The alloy and the hydrogenated alloy thereof were investigated using a X-ray diffraction method. The lattice constants and expansion percentages measured are shown below as Example 33 in Table 7. Also shown in Table 7 are results for the alloy having the composition of $LaNi_5$ as Comparative Example 20, $LaNi_5$ being a $CaCu_5$ type crystal structure. The $LaNi_5$ was prepared by the method described in the present specification. Thus, the elongations of a-axis and c-axis are smaller for Example 33 than for $LaNi_5$. In other words, lattice distortion is less for

Example 33 than for $LaNi_5$. The lattice distortion causes the particle size reduction as the cycles of hydrogen absorption and desorption are repeated. Hence, the increase in surface area per unit weight can be suppressed for Example 33 so that the high rate discharge property is improved.

Table 7

	Alloy			Hydrogenated alloy			Expansion percentage		
	Length of a-axis (Å)	Length of c-axis (Å)	Lattice volume (Å3)	Length of a-axis (Å)	Length of c-axis (Å)	Lattice volume (Å3)	Length of a-axis (%)	Length of c-axis (%)	Lattice volume (%)
Example 33	5.027	4.061	88.86	5.323	4.241	104.06	5.89	4.43	17.10
Comp.Ex.20	5.017	3.982	86.80	5.440	4.310	110.5	8.43	8.24	27.30

4. I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize he validity of the application or any patent resulting therefrom.

Dated: January 22, 2002

Satoshi Shima